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PATENT

IN THE U.S. PATENT AND TRADEMARK OFFICE

Appellants:	Yoshiharu OHTA et al.	Conf.:	3366
Appl. No.:	10/594,636	Group:	1793
Filed:	September 28, 2006	Examiner:	Michael MARCHESCHI
For:	SEMICONDUCTOR POLISHING COMPOUND		
Docket No.:	2691-000051/US		

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April 24, 2009

REPLY BRIEF

Sir:

The following comments are directed to the points of arguments and comments raised in the Examiner's Answer mailed February 26, 2009.

I. Rejections under 35 USC §102

Claims 1-18 stand rejected under 35 U.S.C. §102(b) as being anticipated by Chu and Takashina.

In the Response to Arguments section of the Examiner's Answer, it is stated that the claim feature which recites "a content of the fumed silica having a particle diameter of 100 nm or less is 15% by volume or more based on a total amount of the fumed silica" may be broadly interpreted as reciting all of the particles have a size of have a size of 100 nm or less. The Examiner similarly seeks to "broadly interpret" the applied reference.

During examination, "claims yet unpatented are to be given their broadest reasonable interpretation consistent with the specification during an

examination of a patent application" (*Phillips v. AWH Corp.*, 415 F.3d 1303, 75 USPQ2d 1321 (Fed. Cir. 2005), *In re Prater*, 415, F. 2d 1493 (1969)). This standard is also provided as the standard for claim interpretation under MPEP §2111 which recites that "during patent examination the pending claims must be given the broadest reasonable interpretation consistent with the specification." The Patent and Trademark Office ("PTO") determines the scope of claims in patent applications not solely on the basis of the claim language, but upon giving claims their broadest reasonable construction "in light of the specification as it would be interpreted by one of ordinary skill in the art." *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364[, 70 USPQ2d 1827] (Fed. Cir. 2004). Indeed, the rules of the PTO require that application claims must "conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description." (37 CFR 1.75(d)(1), MPEP §2111)).

Thus, when the claims are properly interpreted in light of the specification, it is clear that both Chu and Takashina fail to disclose "a content of the fumed silica having a particle diameter of 100 nm or less is 15% by volume or more based on a total amount of the fumed silica." Rather, Chu discloses polydisperse colloidal silica where the median particle size by volume is about 20 nm to about 100 nm; the span value, by volume, is greater than or equal to about 15nm; and the fraction of particles greater than 100 nm is less than or equal to about 20% by volume of the abrasive particles. Thus, the distribution has a relatively broad span including particles that are relatively large (e.g., above 100 nm). Such large particles contribute to scratching and the appearance of defects on the surface of the substrate subsequent to the CMP process. The presence of such a significant quantity of large colloidal particles (e.g., greater than 100 nm) in the dispersion may result in settling during storage (paragraph [0027]). Even in a most preferred embodiment, Chu includes

a fraction of particles that is greater than 100 nm by volume (see paragraph [0028]). Thus, unlike the semiconductor polishing composition recited in rejected claims, Chu teaches the use of colloidal silica that has particles greater than 100 nm.

Similarly, Takashina discloses that (1) because agglomerated particles are formed from fumed silica particles in manufacturing process, they easily induce scratches to a surface of a substrate; and (2) because colloidal silica particles are relatively spherical, and agglomerated particles are hardly formed therefrom, they produce fewer scratches to a surface, but the polishing rate using colloidal silica is slower. Because an object of Takashina is to improve the polishing rate, it is clear that Takashina concerns colloidal silica particles. Therefore, neither Chu nor Takashina anticipate each and every feature of the rejected claims.

II. Rejections under 35 USC §103

Claims 1-18 stand rejected under 35 U.S.C. §103(a) as being rendered obvious by Chu and claims 1-3, 5-8, 12, 13, 15, 16 and 18 stand rejected under 35 U.S.C. §103(a) as being rendered obvious by Takashina.

Claims 1-18 are not rendered obvious by Chu because Chu teaches away from the features of the recited claims. Chu teaches the use of colloidal silica and not a fumed silica, as recited in the rejected claims. In fact, Chu recognizes problems associated with fumed particles at paragraph [0009] which recites "[T]he agglomerated particles, typical of fumed materials, have a jagged, irregular shape." Further, at paragraph [0051] Chu demonstrates the preferred use of colloidal silica when compared to otherwise identical slurries including fumed silica (see Table I). At paragraph [0052] Chu summarizes the results of Table 1 as clearly showing "that the polydisperse colloidal silica provides the greatest removal rate while providing a polished surface quality that is superior (smoother) than that achieved with the other three abrasives" (see also Tables II and III).

Moreover, Chu recognizes the stability of colloidal silica relative to fumed silica and for this reasons chooses colloidal silica as being "particularly suitable" for the purposes of the invention (see, for example, paragraph [0026] recognizing that colloidal silica is more stable, i.e., less agglomeration of particles). Thus, Chu actually teaches away from the use of fumed silica and therefore does not anticipate or render obvious the rejected claims.

Further, colloidal silica is stable in dispersion and has particles that are relatively spherical in shape. In contrast, fumed silica is unstable and likely aggregates in dispersion. The agglomerated particles, typical of fumed materials particles, have a jagged and irregular shape (Chu at paragraph [0009]). Other disadvantages of the use of fumed materials are described at paragraph [0005] of Takashina. For example, Takashina recognizes disadvantages to the use of fumed silica due to scratches generated on a surface of a polished semiconductor device because of aggregated particles.

As is well known in the art, the abrasion characteristics of silica are affected by the shape of the silica particles. Therefore, particle distribution of particles best qualified for abrasion of a wafer is distinguished between colloidal silica and fumed silica. As is well known in the art, there is a large difference between the two types of silica particles in their respective abrasion characteristics due to their shapes.

In both Chu and Takashina, the use and description of the colloidal silica particles cannot extend to a use and description of fumed silica particles having jagged, irregular shapes compared to the spherical shape of colloidal particles which are entirely different. In other words, the descriptions provided in the size and distribution of the colloidal silica particles in Chu and Takashina cannot be interpreted as being inclusive of the size and distribution of fumed materials due to their very different physical characteristics. Thus, neither Chu nor

Takashina, whether considered individually or in combination, fail to anticipate or render obvious the rejected claims.

III. Particle Size Distribution/Frequency

Claims 4, 9, 10 and 11 stand rejected under 35 U.S.C. §103(a) as obvious over each of Chu and Takashina.

It is alleged that both Chu and Takashina disclose the claimed particle size and maximum frequency. However, in Chu, particles having a diameter of about 60 to 90 nm appear to be present in the maximum frequency by volume with a rapid drop off at a diameter of about 90 nm (see Fig. 1 of Chu). Thus, Chu fails to disclose or suggest a particle size distribution by volume of the fumed silica, the semiconductor polishing composition has a particle size of the maximum frequency in a range of 80 to 115 nm.

Although there may be a small overlap in the ranges there is a critical distinction between the size of the colloidal particles of Chu and the fumed silica particles of the rejected claims. For example, as is well known in the art and as recognized by Chu at paragraph [0009], agglomerated particles of fumed silica have a jagged and irregular shape which will cause polishing flaws to a semiconductor device. It is due to the known instability of fumed silica that causes the particles to agglomerate and form particles having such jagged and irregular shapes that Chu teaches the use of the colloidal silica particles in the range shown in Fig. 1. Due to the criticality of this distinction between the colloidal silica particles and fumed materials, the range disclosed in Chu does not render the claims obvious (see MPEP §2144.05).

In contrast to the claimed range, Takashina is silent regarding a maximum frequency range of particle diameter. It is alleged in the Office Action that because Takashina discloses a maximum particle size of 200 nm a range is provided that encompasses the claimed values. However, the disclosure of a

maximum size is not a description of a frequency range. Rather, Takashina merely discloses a range of particle size (i.e., 2 to 200 nm). As there is no range of particle size having a maximum frequency, there can be no overlap of ranges. Further, as Takashina discloses only a general range of particle size there is no way of determining what particle diameters appear at a maximum frequency. For example, there may be no particles in a range of 80 to 115 nm.

IV. Conclusion

It is respectfully submitted that the remaining points of arguments set forth in the Examiner's Answer were fully addressed in the Appellants Appeal Brief. For at least the reasons set forth herein and then the Appeal Brief, it is respectfully submitted that the pending claims are in condition for allowance.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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